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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,953	01/16/2004	Kiyoshi Satoh	ASMJP.055DV1	8185

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EXAMINER	
LUND, JEFFRIE ROBERT	

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
04/01/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
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Office Action Summary	Application No.	Applicant(s)	
	10/759,953	SATOH ET AL.	
	Examiner	Art Unit	
	Jeffrie R. Lund	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5,6,8-19 and 45* is/are pending in the application.

4a) Of the above claim(s) *11-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,6,8-10,14-19 and 45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/19/07, 1/29/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. In view of the appeal brief filed on December 28, 2007, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Parviz Hassanzadeh/
Supervisory Patent Examiner, Art Unit 1792

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 5-6, 8, 9, 15, 16, and 45 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Fong et al, US Patent 5,812,403, in view of Lorimer et al, US Patent 5,069,938, and Iyer, US Patent 6,498,109.

Fong et al teaches a chemical vapor deposition apparatus comprising: a deposition reaction chamber 200; a plasma discharge chamber 55 that is provided remotely from the reaction chamber and forms a plasma having an activating energy of 500-2500 Watts (column 45 line 47 through column 46 line 67); a source of fluorine containing cleaning gas (NF_3) (column 14 lines 11-31, column 46 line 6) connected to the plasma discharge chamber; piping 47 that links the reaction chamber and the remote plasma discharge chamber; and a gate valve 280 positioned between a remote plasma chamber 55 and a reaction chamber 200. The valve has an opening sized, when fully opened, substantially equal in width to the inner surface of the piping 47, and does not have projections with respect to the inner surface of the piping. Therefore, the valve, when fully open, defines a pressure drop across the valve of less than about 0.1 Torr. (See figures 3 and 6a) The energy coupled to the remote plasma discharge chamber activates fluorine containing cleaning gas within the plasma discharge chamber, and the activated fluorine species in the cleaning gas are brought into the inside of the reaction chamber through the piping and changes solid substances adhered to the inside of the reaction chamber as a consequence of film formation, to gaseous substances, thereby cleaning the inside of the reaction chamber. (Entire document)

Fong et al differs from the present invention in that Fong et al does not disclose that the remote plasma chamber wall, piping, and valves are made from an anodized

aluminum alloy, specifically, fluorine-passivated anodized aluminum; or a radio-frequency (RF) energy source connected to plasma discharge chamber electrodes, the a radio frequency (RF) energy source operates at a frequency between about 300 kHz and about 500 kHz.

Lorimer et al teaches plasma processing components made from a fluorine-passivated anodized aluminum. (Entire document)

Iyer teaches a plasma processing apparatus (see fig. 1) that includes: a remote plasma discharge chamber 12 with oppositely placed electrodes (capacitively coupled), inductive coils (inductively coupled), or a microwave source for forming a plasma remotely; and an RF power source 28 that supplies 50 watts to 5Kw at a frequency between 10 kHz and 200 MHz (see col. 3-lines 24-60) to the remote plasma chamber. (Entire document)

The motivation for making the remote plasma chamber wall, piping, and valve of Fong et al with a fluorine-passivated aluminum is to provide a corrosion resistant material from which to make the wall, piping, and valve as taught by Lorimer et al. Furthermore, it has been held that: the selection of a known material based on its suitability for its intended use is prima facie obviousness (*Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945)); and reading a list and selecting a known compound to meet known requirements is no more ingenious that selecting the last piece to put in the last opening in a jig-saw puzzle (325 U.S. at 335, 65 USPQ at 301).

The motivation for replacing the microwave plasma source of Fong et al with the

plasma discharge electrodes and RF power source of Iyer is to provide an alternate plasma source as taught by Iyer. Furthermore, it has been held that the simple substitution of one known element for another to obtain predictable results is obvious (see *KSR International Co. v. Teleflex Inc.*).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to: make the remote plasma chamber, pipes and valve of Fong et al out of fluorine-passivated aluminum as taught by Lorimer et al; and replace the microwave plasma source of Fong et al with the plasma discharge electrodes and RF power source of Iyer.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al, Lorimer et al, and Iyer, as applied to claims 1-3, 5-6, 8, 9, 15, 16, and 45 above, and further in view of Ikeda, US Patent 6,033,479.

Fong et al, Lorimer et al, and Iyer differ from the present invention in that they do not teach that the valve and piping are heated to prevent the deposition of the cleaning gas.

Ikeda teaches a heating zone 70 that heats valves and pipes to prevent deposition of the process gas. (Figure 2)

The motivation for heating the pipe and valve of Fong et al, Lorimer et al, and Iyer is to prevent deposition of the cleaning gas as taught by Ikeda.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to heat the pipe and valve of Fong et al, Lorimer et al, and Iyer, as taught by Ikeda.

5. Claims 14, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al, Lorimer et al, and Iyer, as applied to claims 1-3, 5-6, 8, 9, 15, 16, and 45 above, and further in view of Noble et al, US Patent 6,450,116.

Fong et al, Lorimer et al, and Iyer differ from the present invention in that they do not teach: the piping between the plasma discharge chamber and the reaction chamber is straight without obstruction and at least ½ inch in diameter; reaction gas inlet and outlet defining a horizontal flow across a substrate surface upon which material is deposited within the reaction chamber; and the piping opens into the reaction chamber downstream of the inlet and upstream of a substrate support configured for supporting a substrate within the chamber.

Noble et al disclose a remote plasma source 300 connected to the reaction chamber 213 via a straight pipe 360 having a diameter of 1 inch such that the reactive species pass from the remote plasma source to the reaction chamber without obstruction. The pipe 360 opens into the reaction chamber downstream of the inlet 269 and upstream of a substrate support 262 configured for supporting a substrate 100 within the chamber, and the reactive species entering into the reaction chamber 213 from the inlet 275 and passing in a horizontal flow across the substrate 100 in the reaction chamber and being exhausted via 270. (Figures 3A, 3B and its description)

The motivation for making the pipe of Fong et al, Lorimer et al, and Iyer straight without any obstruction and with a diameter of at least ½ an inch in diameter is to provide an alternate arrangement of the reaction chamber and the plasma discharge chamber so that radicals can be efficiently delivered to the reaction chamber as taught

by Noble et al.

The motivation for placing the pipe such that a horizontal flow across the substrate is produced in the apparatus of Fong et al, Lorimer et al, and Iyer is to provide an alternate arrangement of the reaction chamber and the plasma processing chamber as taught by Noble et al. Furthermore, it was held that the rearrangement of parts is obvious (see *In re Japikse* 86 USPQ 70).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the pipe of Fong et al, Lorimer et al, and Iyer straight without any obstruction and with a diameter of greater of ½ or an inch as taught by Noble; and to position the pipe of Fong et al, Lorimer et al, Iyer, and Fong et al such that a horizontal flow across the substrate is produced as taught by Noble et al.

6. If it is determined that generic gate vale described by Fong et al does not teach that the opening of the valve is sized, when fully opened, substantially equal in width to an inner surface of the piping, and the valve does not have projections, when fully opened, with respect to the inner surface of the piping, and thus have a pressure drop of less that 0.1 torr, the following rejections are provided.

7. Claims 1-3, 5-6, 8, 9, 15, 16, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al, US Patent 5,812,403, in view of Lorimer et al, U.S. Patent 5,069,938, Iyer, U.S. Patent 6,498,109, and Hackman et al, US Patent 3,963,214.

Fong et al teaches a chemical vapor deposition apparatus comprising: a deposition reaction chamber 200; a plasma discharge chamber 55 that is provided

remotely from the reaction chamber and forms a plasma having an activating energy of 500-2500 Watts (column 45 line 47 through column 46 line 67); a source of fluorine containing cleaning gas (NF_3) (column 14 lines 11-31, column 46 line 6) connected to the plasma discharge chamber; piping 47 that links the reaction chamber and the remote plasma discharge chamber; and a gate valve 280 positioned between a remote plasma chamber 55 and a reaction chamber 200. The energy coupled to the remote plasma discharge chamber activates fluorine containing cleaning gas within the plasma discharge chamber, and the activated fluorine species in the cleaning gas are brought into the inside of the reaction chamber through the piping and changes solid substances adhered to the inside of the reaction chamber as a consequence of film formation, to gaseous substances, thereby cleaning the inside of the reaction chamber. (Entire document)

Fong et al differs from the present invention in that Fong et al does not disclose that the remote plasma chamber wall, piping, and valves are made from an anodized aluminum alloy, specifically, fluorine-passivated anodized aluminum; a radio-frequency (RF) energy source connected to plasma discharge chamber electrodes, the a radio frequency (RF) energy source operates at a frequency between about 300 kHz and about 500 kHz; or the gate valve has an opening sized, when fully opened, substantially equal in width to the inner surface of the piping, and does not have projections with respect to the inner surface of the piping and defines a pressure drop across the valve of less than about 0.1 Torr.

Lorimer et al teaches plasma processing components made from a fluorine-

passivated anodized aluminum. (Entire document)

Iyer teaches a plasma processing apparatus (see fig. 1) that includes: a remote plasma discharge chamber 12 with oppositely placed electrodes (capacitively coupled), inductive coils (inductively coupled), or a microwave source for forming a plasma remotely; and an RF power source 28 that supplies 50 watts to 5Kw at a frequency between 10 kHz and 200 MHz (see col. 3-lines 24-60) to the remote plasma chamber. (Entire document)

Hackman et al teaches a gate valve that is sized, when fully opened, substantially equal in width to an inner surface of the piping, and the valve does not have projections, when fully opened, with respect to the inner surface of the piping. Thus, the valve has a pressure drop of less than 0.1 torr. (Figures 1 and 4)

The motivation for making the remote plasma chamber wall, piping, and valve of Fong et al with a fluorine-passivated aluminum is to provide a corrosion resistant material from which to make the wall, piping, and valve as taught by Lorimer et al. Furthermore, it has been held that: the selection of a known material based on its suitability for its intended use is prima facie obviousness (*Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945)); and reading a list and selecting a known compound to meet known requirements is no more ingenious that selecting the last piece to put in the last opening in a jig-saw puzzle (325 U.S. at 335, 65 USPQ at 301).

The motivation for replacing the microwave plasma source of Fong et al with the plasma discharge electrodes and RF power source of Iyer is to provide an alternate

plasma source as taught by Iyer. Furthermore, it has been held that the simple substitution of one known element for another to obtain predictable results is obvious (see *KSR International Co. v. Teleflex Inc.*).

The motivation for replacing the generic gate valve of Fong et al is to provide a specific gate valve as required by Fong et al but only generically described.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to: make the remote plasma chamber, pipes and valve of Fong et al out of fluorine-passivated aluminum as taught by Lorimer et al; replace the microwave plasma source of Fong et al with the plasma discharge electrodes and RF power source of Iyer; replace the generic gate valve of Fong et al with the specific gate valve taught by Hackman et al.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al, US Patent 5,812,403, Lorimer et al, Iyer, and Hackman et al, as applied to claims 1-3, 5-6, 8, 9, 15, 16, and 45 above, and further in view of Ikeda, US Patent 6,033,479.

Fong et al, Lorimer et al, Iyer, and Hackman et al differ from the present invention in that they do not teach that the valve and piping are heated to prevent the deposition of the cleaning gas.

Ikeda teaches a heating zone 70 that heats valves and pipes to prevent deposition of the process gas. (Figure 2)

The motivation for heating the pipe and valve of Fong et al, Lorimer et al, Iyer, and Hackman et al is to prevent deposition of the cleaning gas as taught by Ikeda.

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to heat the pipe and valve of Fong et al, Lorimer et al, Iyer, and Hackman et al as taught by Ikeda.

9. Claims 14, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al, US Patent 5,812,403, Lorimer et al, and Iyer, and Hackman et al, as applied to claims 1-3, 5-6, 8, 9, 15, 16, and 45 above, and further in view of Noble et al, U.S. Patent 6,450,116.

Fong et al, Lorimer et al, Iyer, and Hackman et al differ from the present invention in that they do not teach: the piping between the plasma discharge chamber and the reaction chamber is straight without obstruction and at least ½ inch in diameter; reaction gas inlet and outlet defining a horizontal flow across a substrate surface upon which material is deposited within the reaction chamber; and the piping opens into the reaction chamber downstream of the inlet and upstream of a substrate support configured for supporting a substrate within the chamber.

Noble et al disclose a remote plasma source 300 connected to the reaction chamber 213 via a straight pipe 360 having a diameter of 1 inch such that the reactive species pass from the remote plasma source to the reaction chamber without obstruction. The pipe 360 opens into the reaction chamber downstream of the inlet 269 and upstream of a substrate support 262 configured for supporting a substrate 100 within the chamber, and the reactive species entering into the reaction chamber 213 from the inlet 275 and passing in a horizontal flow across the substrate 100 in the reaction chamber and being exhausted via 270. (Figures 3A, 3B and its description)

The motivation for making the pipe of Fong et al, Lorimer et al, Iyer, and

Hackman et al, straight without any obstruction and with a diameter of at least ½ an inch in diameter is to provide an alternate arrangement of the reaction chamber and the plasma discharge chamber so that radicals can be efficiently delivered to the reaction chamber as taught by Noble et al.

The motivation for placing the pipe such that a horizontal flow across the substrate is produced in the apparatus of Fong et al, Lorimer et al, Iyer, and Hackman et al is to provide an alternate arrangement of the reaction chamber and the plasma processing chamber as taught by Noble et al. Furthermore, it was held that the rearrangement of parts is obvious (see *In re Japikse* 86 USPQ 70).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the pipe of Fong et al, Lorimer et al, Iyer, and Hackman et al straight without any obstruction and with a diameter of greater of ½ or an inch as taught by Noble; and to position the pipe of Fong et al, Lorimer et al, Iyer, and Hackman et al such that a horizontal flow across the substrate is produced as taught by Noble et al.

Response to Arguments

10. Applicant's arguments with respect to claims 1-3, 5, 6, 8-10, 14-19, and 45 have been considered but are moot in view of the new ground(s) of rejection. The new rejection no longer includes the combination of Shang et al and Fong et al. Therefore the arguments directed to the propriety of the combination are moot.

11. Applicant's arguments filed December 28, 2007 have been fully considered but they are not persuasive.

a. In regard to the argument that "3. The Examiner has not Demonstrated that the Claimed Valve is Inherently Taught by FIGs 6A and 3 of Fong", the Examiner disagrees. The Applicant is arguing function not structure. The Applicant would be correct if Fong et al showed an obstruction in the form of the gate disk or seat. However, both Fong et al and Hackman et al clearly teach no protruding gate or seat when the valve is completely open. Therefore, they have the capability to be opened in such a manner as to have no pressure drop across the valve. It is true that they could be opened part way, thus, creating a restriction and pressure drop. As noted in the Wikipedia article and the article on gate valves presented in the IDS of January 29, 2008, gate valves are usually opened or closed all the way. Thus, one of ordinary skill in the art operating the valve of Fong et al or Hackman et al would open the valve all the way which would result in the claimed valve. Opening a gate valve part way erodes the gate and causes the valve to leak.

b. In regard to the arguments directed to Noble et al, the Examiner disagrees. First, part 360 of figure 6 and its location in figure 3A is not schematically drawn, and 360 is not "generically drawn", in fact, it has its own drawing in figure 6. Noble et al clearly shows that there is nothing in the flow passage, and the specification specifically teaches that one end of the inlet member 360 is connected to the plasma generator 300 and the other end is attached directly to the sidewall of the process chamber. (Column 11 lines 17-25) Noble et al clearly teaches away from the idea of obstructing the flow path.

One of ordinary skill in the art reading Noble et al would be motivated to rearrange the plasma supply line of Fong et al such that it did not pass through the mixing block and was directly aligned with the plasma inlet, thus, providing a direct supply to the plasma apparatus.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art teaches the technological background of the invention.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrie R. Lund/
Primary Examiner
Art Unit 1792

JRL
3/24/08